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Role of AI in Early Detection of Depression and Anxiety among College Students with Special Reference to Coimbatore District

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ABSTRACT

The growing number of college students experiencing depression and anxiety has become a big worry for public health, especially in busy academic settings like those in Coimbatore District. Spotting these issues early and acting quickly is very important to stop them from getting worse. In this situation, Artificial Intelligence (AI) has a big role to play in helping find signs of mental health problems early on. This study looks at how AI tools such as machine learning, natural language processing and predictive analytics can help detect early signs of depression and anxiety in college students. These AI systems can study things like behavior, social media activity, the way people speak and physical responses to spot students who might be at risk. The study uses a descriptive research design and focuses on students from Arts and Science colleges in Coimbatore District. It aims to understand how aware students are of AI tools, what they think about them and whether they accept them for mental health checks. Data will be gathered through questionnaires and then analyzed using statistical methods to see how using AI relates to better early diagnosis. The results are likely to show how AI can help improve mental health support on campus, make people feel better emotionally and reduce the shame people feel about mental health problems. Overall, the study shows how important it is to use AI in student counseling systems to create a more proactive and data-based way of looking after mental health in higher education.

KEYWORDS: *Artificial Intelligence, Early Detection, Depression, Anxiety among College Students.*

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INTRODUCTION

Mental health issues like depression and anxiety are becoming more common among college students, which can impact their studies, relationships and general sense of well-being. Moving to college, dealing with school pressure, facing social expectations and worrying about future jobs often lead to emotional struggles. In Coimbatore District, a key area for education in Tamil Nadu with many colleges and universities, there is a growing worry about student mental health. This calls for new and tech-based solutions. Artificial Intelligence (AI) has become a strong tool in spotting and managing mental health problems early. Using advanced data analysis, machine learning and natural language processing, AI can detect early signs of depression and anxiety by looking at things like speech, writing, facial expressions and behavior. Unlike old ways of checking mental health, AI can handle a lot of real-time data quickly and give accurate, personalized insights. Using AI in mental health care helps in early action, allowing teachers, counselors and medical staff to find students who might be at risk before things get worse. In Coimbatore, where students from different backgrounds face various stress and emotional issues, AI tools can help in early diagnosis and better mental health. This study looks at how AI can help in finding depression and anxiety in college students, focusing on Coimbatore. It also checks how aware students are of AI-based tools, how effective they are and how they can be used properly in campus mental health programs. The goal is to help build a mental health support system that includes

technology, which can improve emotional strength and academic performance among students.

DEFINITION

Definition of Artificial Intelligence

"Artificial Intelligence is the capability of a machine to imitate intelligent human behavior, including learning, reasoning and self-correction."-**Russell, S. J., & Norvig, P. (2021)**.

Definition of Depression

According to WHO, depression is *"a* mental disorder characterized by persistent sadness and a lack of interest or pleasure in previously rewarding or enjoyable activities, accompanied by an inability to carry out daily activities, for at least two weeks.- World Health Organization. (2021).

Definition of Anxiety

Anxiety disorders are "characterized by excessive fear and worry and related behavioral disturbances that interfere with daily functioning."-World Health Organization. (2022). ICD-11 Classification of Mental and Behavioural Disorders.

STATEMENT OF THE PROBLEM

In recent years, mental health problems like depression and anxiety have become more common among college students, which is a big concern for their studies, friendships and general well-being. In Coimbatore District, many students from arts and science colleges face a lot of pressure from schoolwork, social pressures and worries about their future. These things often lead to stress and emotional problems. But many students don't get help on time because of the fear of being judged, not knowing much about mental health or not having easy access to counseling services. This delay can make their mental health problems worse. Traditional ways of checking mental health, like questionnaires or talking to counselors are often not very effective. They can be slow, depend on what people say and not cover everything. AI, on the other hand, can help find signs of depression and anxiety earlier by using data and machine learning. It can look at how students act online, their emotions and how they communicate to spot those who might need help. But in Coimbatore, using AI for mental health is not very common. There is not enough knowledge about it, support for the technology or understanding of the ethical issues. This study looks at how useful AI is in finding depression and anxiety early among college students in Coimbatore and also checks what students think about using this kind of technology for mental health checks.

SCOPE OF THE STUDY:

The study looks into how Artificial Intelligence (AI) can help find depression and anxiety early in college students, especially those in Coimbatore District. It focuses on students from arts and science colleges there. The research includes students from different academic fields; years of study and genders to better understand how common these mental health issues are and how they might show up. The study uses AI tools like machine learning, natural language processing and predictive analytics to spot early signs of mental health problems before they get worse. It also looks at how aware students are of AI-based mental health tools and how open they are to using technology for mental health checks. The study checks how well AI can give timely, correct and personalized information about students' mental health. It also looks at how AI tools can be used in college counseling centers and support programs in Coimbatore. While focusing on AI, the study also considers issues like ethics, data privacy and how to use AI responsibly when dealing with sensitive mental health topics. The research gives advice to college leaders, mental health experts and policy makers on how to use AI better for early mental health support and to improve students' emotional health. The study is mainly about AI solutions for depression and anxiety in college students in Coimbatore and could help future research and mental health plans in similar areas.

REVIEW OF LITERATURE

Park et al. (2024) the review found that AI excels in accuracy, particularly in monitoring and prediction of depression. Biomarker-derived data demonstrated the highest accuracy, with Convolutional Neural Networks (CNN) proving most effective. The study affirms the therapeutic benefits of AI, including treatment, detection and disease prediction, highlighting its potential in analyzing monitored data for depression management. Study Design: Systematic literature review. Sample Size: Analysis of 95 studies. Sampling Method: Comprehensive search across IEEE Xplore, PubMed and Web of Science using keywords related to depression, mental health, machine learning and prediction/diagnosis.

Zafar & Alam (2024) the review discusses the development of AI-powered tools for depression and anxiety detection, from intricate algorithms to practical applications. It emphasizes the importance of AI in delivering essential mental health care services, highlighting its role in early identification and intervention of these pervasive mental health disorders. Study Design: Narrative literature review. Sample Size: Review of 99 publications. Sampling Method: Search of PubMed, Google Scholar and Science Direct using keywords related to AI, depression and anxiety

Hadzic et al. (2024) the study found that GPT-4 outperforms both BERT and GPT-3.5 models in detecting depression from text data. The models were evaluated based on metrics such as accuracy, precision and recall, with GPT-4 demonstrating superior performance. This highlights the potential of advanced AI models in enhancing early detection of depression through text analysis. Study Design: Comparative study. Sample Size: Not specified. Sampling Method: Comparison of three natural language processing models (BERT, GPT-3.5 and GPT-4) on three different datasets.

Methodology of the Study

Objectives of the Study

- To study the personal profile of the respondents.
- To access the role of AI in early detection of depression and anxiety among college students.
- To discover the association between personal profile and AI in early detection of depression and anxiety among college students.
- To assess the difference between personal profile and AI in early detection of depression and anxiety among college students.
- To study the influence role of AI in early detection of depression and anxiety among college students.

Research Design: The present study is descriptive in nature, aiming to examine and describe the personal profiles and role of AI in early detection of depression and anxiety among college students.

Universe of the Study: The universe of the study comprises arts and science college students in Coimbatore District**.** From this population, the researcher selected a total of 100 students to constitute the study sample.

Sampling: A non-probability sampling method was adopted for the study. Specifically, purposive random sampling was engaged to identify and select respondents who met the criteria relevant to the study objectives. Using this method, 100 students from arts and science college students in Coimbatore were selected as the sample for data collection.

Tools for Data Collection: Data were collected using a self-structured questionnaire designed to role of AI in early detection of depression and anxiety among college students.

Data Analysis: The collected data were analyzed using various statistical tools, including simple percentage analysis**,** independent t-test and ANOVA**,** to interpret the findings and derive meaningful conclusions regarding the role of AI in early detection of depression and anxiety among college students.

Finds of the Study

Factors	MEDIUM	FREQUENCY	PERCENT
Age	17yrs-23yrs	72	72%
Gender	Female	69	69%
Education Qualification	UG	64	64%
No. of Dependents	1-2	71	71%
Locality	Semi urban	75	75%
Socio economic background	Upper –middle	68	68%
Fathers educational qualification	12th	62	62%
Fathers Occupation	Private employee	72	72%
Family monthly income (in Rs.)	Rs.35,000- Rs.50,000	71	71%
Students Hobbies	Music Listening and Playing games	73	73%

Simple Percentage Analysis

- Majority (72%) of the respondents is in the age group between 17yrs-23 yrs.
- Majority (69%) of the respondents have female.
- Majority (64%) of the respondents have education qualification UG.
- Nearly (71%) of the respondents have numbers of dependents of 1-2.
- More than (75%) of the respondents have locality in semi urban.
- Majority (68%) of the respondents have socio economic background of upper middle.
- Majority (62%) of the respondents have 12th of father's educational qualification.
- Majority (72%) of the respondents have occupation of private employee.
- Majority (71%) of the respondents have family monthly income of Rs.35,000-Rs.50,000.
- Majority (73%) of the respondents have music listening and playing games of students hobbies.

DISTRIBUTION OF THE RESPONDENTS BY LEVEL ROLE OF AI IN EARLY DETECTION OF DEPRESSION AND ANXIETY AMONG COLLEGE STUDENTS

S. No	Role of AI in Early Detection of Depression and Anxiety among College Students	Number of Respondents	Percentage %
1	High	60	60
2	Moderate	25	25
3	Low	15	15
TOTAL		**100**	**100**

INTERPRETATION

The above table highlights the artificial intelligence to reduce parental burnout during children's homework supervision level of the respondents. It is understood from the above table that 60 percent of the respondents have high level of role of AI in early detection of depression and anxiety among college students, 25 percent of the respondents have moderate level of role of AI in early detection of depression and anxiety among college students and 15 percent of the respondents have a low level of role of AI in early detection of depression and anxiety among college students.

Influence of Personal Profile and Level Role of AI in Early Detection of Depression and Anxiety among College Students

Variables	Statistical tool	Value	Result
Age and Role of AI in early detection of depression and anxiety among college students.	Chi-Square	6.105(a) (P=.001 < .005)	Significant
Gender and Role of AI in early detection of depression and anxiety among college students.	Chi-Square	5.054 (a) (P=.000 > .106)	Not Significant
Educational Qualification and Role of AI in early detection of depression and anxiety among college students.	t-test	t=8.225 P = .002< 0.05	Significant
No. of Dependents and Role of AI in early detection of depression and anxiety among college students.	t-test	t=5.103 P = .003< 0.05	Significant
Locality and Role of AI in early detection of depression and anxiety among college students.	t-test	t=7.225 P = .003< 0.05	Significant
Socio Economic Background and Role of AI in early detection of depression and anxiety among college students.	ANOVA	F=6.125 P = .001< 0.05	Significant
Fathers Educational Qualification and Role of AI in early detection of depression and anxiety among college students.	ANOVA	F= 7.346 P = .115> 0.05	Not-Significant
Fathers Occupation and Role of AI in early detection of depression and anxiety among college students.	ANOVA	F=8.275 P = .112< 0.05	Significant
Family monthly income (in Rs.) and Role of AI in early detection of depression and anxiety among college students.	ANOVA	F= 6.505 P = .204> 0.05	Not-Significant
Student's hobbies and Role of AI in early detection of depression and anxiety among college students.	ANOVA	F= 7.132 P = .003< 0.05	Significant

- There is a significant association between age and the level of role of AI in early detection of depression and anxiety among college students.
- There is a no significant association between gender and the level of role of AI in early detection of depression and anxiety among college students.
- There is significant difference in the education qualification and the level of role of AI in early detection of depression and anxiety among college students.
- There is significant difference in the number of dependents and the level of role of AI in early detection of depression and anxiety among college students.
- There is significant difference in the locality and the level of role of AI in early detection of depression and anxiety among college students.
- There is significant difference in the socio economic background and the level of role of AI in early detection of depression and anxiety among college students.

- There is no significant difference in the father's education and the level of role of AI in early detection of depression and anxiety among college students.
- There is significant no difference in the fathers occupation and the level of role of AI in early detection of depression and anxiety among college students.
- There is no significant difference in the family monthly income and the level of role of AI in early detection of depression and anxiety among college students.
- There is significant no difference in the students hobbies and the level of role of AI in early detection of depression and anxiety among college students.

Recommendations

- Colleges should implement AI-powered screening systems that regularly analyze students' digital behavior (such as attendance, engagement or social media interactions) to identify early warning signs of depression and anxiety, allowing for timely psychological support.
- AI models should be developed and validated in collaboration with psychologists and psychiatrists to ensure that predictive algorithms are clinically accurate and ethically sound, reducing the risk of misdiagnosis.
- Educational institutions should conduct awareness workshops for students, faculty and counselors to educate them about the use of AI tools in mental health assessment and reduce stigma associated with seeking AI-assisted psychological help.
- Strict privacy protocols must be established to protect students' personal and behavioral data. Institutions should ensure AI systems comply with ethical standards, maintaining confidentiality and obtaining informed consent from students.
- AI-driven emotion recognition systems using voice tone, facial expressions and written communication can be employed to detect emotional distress early, enabling counselors to intervene before symptoms escalate.
- AI should be used not only to detect but also to design personalized intervention strategies such as customized counseling schedules, stress management programs and digital therapeutic suggestions based on individual emotional profiles.
- AI-based mental health modules can be integrated with academic counseling systems to monitor academic stress, attendance irregularities and performance fluctuations that may indicate underlying anxiety or depression.
- Colleges and universities should encourage interdisciplinary research between computer science and psychology departments to develop region-specific AI models suited to the cultural and social contexts of Indian students, especially in Coimbatore district.
- AI-enabled mobile applications can be designed for continuous mental health monitoring through mood tracking, chatbot-based emotional check-ins and real-time support, making help accessible and immediate.
- Government and educational authorities should frame policies encouraging the ethical adoption of AI in mental health care, allocate funding for research and establish guidelines to ensure responsible use of AI in educational settings.

CONCLUSION

The role of Artificial Intelligence (AI) in the early detection of depression and anxiety among college students is increasingly significant in today's digital and fast-paced academic environment. AI-driven systems can efficiently analyze behavioral patterns, speech, facial expressions and digital footprints to identify early signs of psychological distress, enabling timely intervention. By integrating AI into college mental health programs, institutions can provide proactive and personalized support to students, helping to reduce the stigma around mental health and promote emotional well-being. Furthermore, AI's predictive capabilities can assist counselors and educators in understanding students' mental health trends, allowing for data-driven decision-making and preventive strategies. However, ethical considerations such as data privacy, consent and the accuracy of AI predictions must be strictly adhered to. Overall, the use of AI in mental health detection represents a transformative step toward creating emotionally resilient campuses. When responsibly implemented, it can bridge the gap between technology and psychology empowering institutions to safeguard the mental well-being of students and fostering a supportive educational environment for holistic growth.

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